

THE MOTOR AGE

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A FRENCH AUTOMOBILE TROLLEY

Of late years various attempts have been made to run an electric carriage by current drawn from an overhead trolley wire. The chief obstacle encountered in using an aerial conductor was the difficulty of holding the trolley wheels in contact with the wires, particularly when the vehicle was rounding curves. The results obtained were not very encouraging. The underrunning trolley wheel carried on a pole could not be used; for the carriage could not turn out of the way of other vehicles on the road. The substi-

tution of a cable for the pole and the employment of a trolley running over instead of under the wires prove no more successful; for the trolley was merely dragged along by the vehicle. These difficulties seem to have been very ingeniously overcome in a system devised by a French engineer, M. Lombard-Gerin, in which a self-propelling trolley is employed, running along at a speed corresponding with that of the vehicle to which it supplies current.

The trolley is driven by a small, three-

phase, induction-motor, supplied with current generated by the motor of the vehicle. The trolley-carriage comprises two metal wheels running on the feed and return wires and serving to make the contact. Between these wheels are two insulating fiber friction-wheels, which engage the motor and thus drive the trolley-carriage. The trolley is driven at a speed slightly greater than that of the vehicle. This small excess of speed is absorbed by the slip of the motor, the slip between the friction wheels and motor, and the slip of the trolley-wheels. Tension on

for the reason that aluminum is largely used in its construction.

The vehicle-motor is of the continuous current, series wound type. At the side opposite the commutator, the armature carries three rings connected with the winding at three points separated from one another by a distance equal to one-third the angle between two like field poles. The three-phase current generated by the motor flows through three conductors in the flexible cable, directly to the three-phase motor of the trolley-carriage. The speed of the trolley mo-



AUTO TROLLEYS IN ACTION.

the cable increases the resistance and consequently the slips. The trolley-motor is provided with an electro-magnetic friction-brake, actuated by current taken from the trolley line. The trolley-carriage is elastically suspended by means of springs, the tension of which can be regulated as desired. The cable leading to the vehicle is connected with a double frame on the carriage by a universal joint, which enables it to swing in all directions. The entire trolley-carriage weighs only forty pounds (18 kilograms),

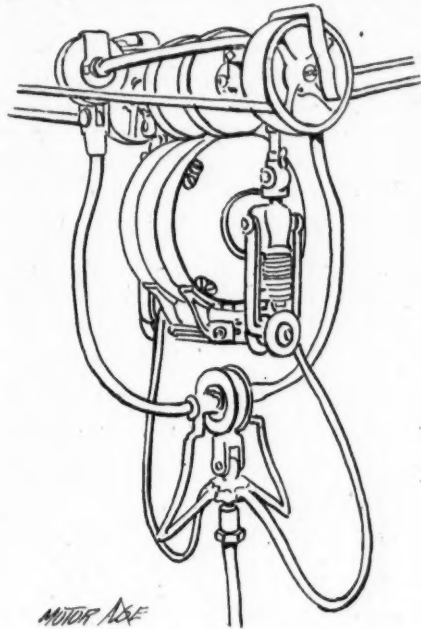
tor depends on the frequency of the three-phase current by which it is actuated; and this frequency in turn depends upon the number of revolutions of the carriage motor. Hence the speeds of the trolley and vehicle motors are practically synchronous; and the trolley carriage automatically regulates the rate of its motion to that of the vehicle.

The flexible cable is composed of six conductors. Two wires of large cross section serve the purpose of conducting the overhead current to the motor of the ve-

hicle. Three smaller wires supply the trolley-motor with the triple-phase current generated by the automobile-motor, and one small wire connected with a pedal in the carriage serves to throw the magnets of the trolley-motor brake into the circuit of the main line. The brake is used when the trolley is running on a steep incline of the wire. The carriage is not essentially different from the ordinary electromobile. It is provided with a pole which carries at its extremity a junction-box for the reception of the cable. The boxes of the carriages on the line being similar and interchangeable, it is possible for vehicles running in opposite directions to exchange their cables and continue their journey. To permit the trolley to move in either direction a pole-changing switch forms part of the three-phase circuit, so that the connections of two of the conductors can be reversed, to change the direction of the motor's rotation.

M. Lombard-Gerin's system has been tried on an experimental line 900 meters in length, on the Quai d'Issy-les-Moleneaux along the Seine, just outside of the

city of Paris. According to Le Genie



The Automotor Trolley.

Civil, the results of severe tests made on this line were very encouraging.

FROM THE FOUR WINDS

AUTO TRANSPORTATION IN WASHINGTON

Washington, D. C., April 6.—With automobiles of every description flitting about the streets, the national capital is taking on the appearance of a metropolitan city. The local public has taken very kindly to the new mode of locomotion and the patronage of the several companies operating automobile services is increasing every week. The congressional contingent is much interested in the possibilities of the automobile and a number of prominent statesmen have expressed the opinion that it is destined to revolutionize the present methods of living and methods of travel.

In line with the progressive policy adopted by the Baltimore & Ohio Rail-

road Co. is the establishment by that company of an electric automobile service in connection with its trains in this city. The automobiles are made especially for this service and are so built that two small trunks can be carried on the supports at the rear of the vehicle and the top of the cab provides ample room for small traveling bags and hand luggage. The vehicles are lighted by electricity and in each is a clock and a dial showing the distance traveled, the time the cab is in use, and the amount of fare the passenger should pay. The service has only been in operation a few days, but it has jumped into immediate popularity.

It is expected that the American Auto-

carette Co., a concern recently incorporated under the laws of Virginia with a capital of \$200,000, will inaugurate an automobile passenger line in this city about the first of July. There is now being built for the company, which was organized by a number of representative business men of this city, a number of electric autocarettes, capable of carrying twenty passengers. They will be handsomely and strongly built, with heavy rubber tires, and will have ample storage batteries and powerful motors, capable of moving the car at the rate of twelve miles an hour, the limit of speed in this city. The design of the vehicle to be operated is covered by patents, the rights for the District of Columbia having been secured by this company. The electricity for storing the batteries will be purchased until the company establishes a plant of its own. It is the intention of the promoters to run a line of these vehicles from the eastern to the northwestern ends of the city, with intersecting cross lines, for which service the regular street car fare of five cents per head will be charged.

NEWS FROM BOSTON

Boston, April 8.—The sport here is steadily booming, the Skinner-Champion race being the center of gossip. This will be held about May 1, over a course not yet selected. The statement in another motor publication that Champion had backed out is untrue. He has covered Skinner's money and the race is on. The date has to be put late because the country roads, over which it will have to be held, will not be in shape before the first of next month for tricycles capable of twenty or more miles an hour.

Champion is in more trouble. After being arrested and paying \$10 and costs, he is now in danger of being called into court in Cambridge for scaring a horse, which ran away and smashed a carriage \$50 worth—so the owner claims. As the horse was not hitched and was unattended, Champion does not see where he was to be blamed.

One other exciting occurrence happened in Waltham, to which city a local agent

had taken a prospective customer and his wife for a trial spin. After stopping in Waltham, the agent started the motor, with the clutch free, as he supposed, and then left it a moment with the other occupants sitting in it. In some way the clutch worked into contact and the carriage started off on its own hook. It went slowly, however, the occupants shouting for assistance. This came, running sharply, in the shape of the agent, who piloted the carriage back to Boston, somewhat subdued in enthusiasm.

ANENT NEW YORK CHAUFFEURS

New York, April 8.—C. S. Weston, of Scranton, Pa., and Mrs. Weston will tour "a-motor" for two months this summer in England and France, as will Mr. and Mrs. Albert C. Bostwick of New York.

Vice-President G. F. Chamberlin, of the Automobile Club of America, in the recent club run rode in the same carriage in which he toured through the White mountains last year. "In the last two years," says he, "I have covered more than 5,000 miles in this car and have not spent more than five dollars in tinkering it all this time."

"Pete" Fisher, well known around New York as the practical demonstrator of the Oakman gasoline wagons, was recently riding on one of the boulevards when he came across a murderer chase. An Italian had become involved in an altercation with a fellow-laborer, had stabbed him, and was fleeing in the distance. In an instant Fisher called to a near-by policeman to jump in, which the Hibernian guardian of the peace consented to do, though he required considerable persuasion to risk his precious neck in "that dommed machine." "Pete" started in hot pursuit. The fleeing Italian turned his head for an instant, saw his mysterious pursuer, threw up his hands, dropped on the ground and surrendered.

Park Commissioner Brower, of Brooklyn, is giving automobiles considerable annoyance about Prospect Park permits. A "gasolener" recently applied to him for one and was referred to the police department. At police headquarters he was told that they had never heard of per-

mits being required for gasoline wagons. Returning to Commissioner Brower, he was informed that he would have to undergo the machinist's test. After giving a little exhibition drill he was grudgingly given a permit for two days only. He finally resolved to go it alone without a permit and ever since has been riding in the park without once being hauled up by a policeman and asked to show his permit.

AUTOMOBILES AND GOOD ROADS

The bicycle, the suburban electric railroad, and the automobile will be three important factors in the final success of the good roads movement which has been too long delayed and obstructed in the United States, says the Cleveland Leader. The effect of the first and second is already plain. It may easily happen that the influence of the automobile will be the greatest of all, in the long run.

Many millions of dollars have been invested in the horseless carriage industry. Its scope is steadily widening. The power of the makers and users of automobiles will soon be very great. It will be felt in legislation more than the influence of bicyclists ever has been. It will represent an interest which is sure to increase steadily and may reach enormous proportions.

It is certain that the entire weight of the automobile industry and fashion will be thrown into the scale in behalf of good roads. Side paths may appease bicyclists, but never the owners of horseless carriages. All plans for roads made of steel bands or broad rails will fail to meet the needs of the new interest, which will call for broad and commodious country roads as well as properly paved and cleaned city streets.

All such demands will come with peculiar grace from the horseless carriage hosts of the near future, because their vehicles will tend to improve rather than injure highways. The expense of repairs and cleaning, which must be counted on with horses in common use, will be mainly done away with, as far as automobiles displace other vehicles. Of course the same statement applies to bicycles.

Soon it will be perceived that with the

right sort of rural highways automobiles can do much of the best work of suburban street railroads. They can go as fast as any one with a grain of prudence will care to ride. They can pass slower vehicles on the same road. There is no need of fixed stopping places for horseless carriages. They will require neither charters, exclusive rights, nor special favors of any kind from the public authorities. All that they will want can be given in smooth, hard, well made and wide highways.

The bicycle and the suburban railroad have done much to bring town and country together. They have awakened new love of nature in multitudes of city dwellers. They have greatly widened and brightened the social life of the country. Farms formerly quite isolated from city opportunities for culture and pleasure have been brought close to the busiest centers of urban life. Now it remains for the automobile to give all this beneficent new growth of national unity a still greater impulse by forcing the creation of adequate, enduring and well kept public roads.

No gift of prophecy is needed to see that in this direction will be found one of the greatest and most valuable forms of national development in the next quarter of a century.

ASTOR'S STAGE LINE

New York, April 8.—John Jacob Astor has organized an electric automobile omnibus service between Rhinecliff and Rhinebeck, which will be put into operation as soon as the hill at the Rhinecliff station is removed, contract for which has been awarded. This service will connect Rhinebeck with the New York Central railroad.

A PHILADELPHIA AUTO CLUB

Philadelphia, April 9.—On Wednesday night last, at the Hotel Flanders, the initial steps were taken looking toward the formation of the Automobile Club of Philadelphia. Fourteen gentlemen, prominent in local business and social circles, were present. After some discussion it was decided to limit the membership to

fifty for the present, and a committee was appointed to look for a desirable club house in the neighborhood of Broad and Walnut Streets large enough to accommodate the members' vehicles. All the facilities for charging and repairing automobiles will be installed immediately.

The meeting was presided over by G. Jason Waters, and after all the details had been thoroughly discussed the following committee was appointed to draft a constitution, which will be on lines similar to that of the Automobile Club of America: James Elverson, Jr., of the Philadelphia Inquirer; George W. Childs Drexel, of the Public Ledger; Robert E. Glendinning, Horace Harding and G. Jason Waters, with S. P. Rotan as counselor. This committee was ordered to report in a fortnight.

A ROCHESTER CHAUFFEUSE

The delights of a trip in an automobile are not familiar to everyone as yet, says a Rochester paper, but the fascination of such a trip lingers as long as memory. Outside of New York city or Chicago, few women have yet learned to master the inanimate steed, although in the cities named it is quite the fad for fashionable women to drive the automobile entirely unattended. Rochester, not to take a back seat from any progressive city, has a dainty little woman who may be seen almost daily, skillfully driving her handsome automobile, equally fearless whether the trip be taken in the crowded shopping centers of the city or along the more exclusive residence avenues.

The plucky little woman is Mrs. C. J. Conolly, wife of the well known bicycle and automobile dealer, and her favorite steed is the "Stanhope," a dashing and most comfortable Waverly electric carriage, which is very simple as to mechanism and destined to be very popular among women. As Mrs. Conolly drives around town she rests the left hand on the controller, a little lever which furnishes the power, while the simple steering device is gracefully managed by the use of her right hand. Monday Mrs. Conolly took a party of college girls for a drive to South Park, and the rain storm

on the home trip did not dampen the spirits of the happy party in the least.

TECHNICAL COMMITTEE APPOINTED

New York, April 8.—The Automobile Club of America, has appointed the following technical committee, to whom all questions requiring expert handling will be referred: C. J. Field, chairman; Prof. R. H. Thurston, Cornell University; Prof. Elisha Thompson, Swampscott, Mass.; T. Cumerford Martin, editor Electrical World; Alexander Fischer, Dr. S. S. Wheeler and Carleton May.

C. J. Field gave "A Practical Talk on Automobiles" at the club rooms last evening.

EN ROUTE TO THE KLONDYKE

According to dispatches from Vancouver, B. C., E. Jaune de Lamare, Ralph Merville and S. Crom, who are going to attempt to reach Dawson City by means of an automobile, in the manner described in the Motor Age some weeks ago, have left by steamer for the Klondike. They have a five-horsepower automobile, a three-horsepower cycle and a tandem. Under favorable circumstances, with moderate weather and good ice, they think they can make the 600 miles between the railway terminus and the Klondike capital in thirty days. They will use gasoline as fuel.

FIRE HORSES MUST GO

Chief Kendall wrote some few weeks ago to a New York automobile factory for information about the merits of the machines and their applicability for the chiefs of the department, says the Detroit News. In reply he received enough literature to begin a small private library, with cuts of chiefs' buggies fitted with the motors and guaranteed to get to the fire before the engines left the house.

"That's just the trouble," said the chief. "If the fire chiefs are supplied with automobiles, the hose carts and fire engines ought to be also, for what use is it for the chief to get there away in advance of the engines? I think, never-

theless, that the time is not far distant when the Detroit fire department's apparatus will be supplied with motors instead of horses, but we will wait until the experiment has been tried in some of the big cities.

"I believe with our splendid streets we would be in a better position to use automobiles than they are in other cities. We have few hills to climb, the pave-

ments are in good condition, and the streets are broad.

"I know the machines are in use in other cities and I believe they are giving satisfaction to the departments, but as yet they are in their experimental stage, and are too costly for their introduction here. I am told that the rubber tires for the engine alone would cost about \$400."

THE AUTOMOBILE

I am the Automobile,
And I run
My never-tiring course
Along the roadways
Of the world,
And leave no hoofprints
In the sands of time.
I am the horse's Juggernaut,
Likewise the mule's,
And over their recumbent necks
My whirling wheels
Pass to an era
Not for them.
They mark a step in progress
Through six thousand years;
I leap the bounds
Of all the past
And whizz into the future with
A swish that marks me here
This instant, and the next
A thousand yards ahead.
I stand, a pioneer,
Upon the lofty ridge
Between the new and old,
And back down the Klismet path
I hear the slow, surceasing tread
Of hoofbeats moving to the field
Of desuetude.
I look before and see
A million multiples of me
Subserving man
In all his moving needs,
A ministrant of motion that
Is measureless as are
Its master's wants.

By night and day I stand and wait,
And at the master's beck
I go.
I have no tired eyelids for
The hand of Sleep
To lay its fingers on;
No hunger gnaws my vitals out;
No muscles, overstrained and sore,
Plead silently to me for rest.
In my new lexicon
There's no such word as rest;
And tireless as may be
The energies of man,
My service meets them everywhere,
And tireless as they,
And makes cessation cowardice.
I am the movement
Of the time to come;
And in me motion finds
Its rhythm and its poesy,
Its "get there"
And its best activity.
I am The Thing;
The It of passage and
The master servant of the master man;
Through the splendors of the future,
In every land and clime,
I will lead the grand procession
Up the corridors of time.
In the niche of transportation
In the Pantheon of Fame,
God among the gods of motion,
I shall set my seal and name.
Wm. J. Lampton in New York Sun.

WEEKLY PATENT OFFICE BUDGET

A REMARKABLY INGENIOUS SPEED-CHANGING TRANSMISSION BY MEANS OF A COMBINATION OF FRICTION AND DIFFERENTIAL GEARS—A CLEVER VULCANIZER FOR PUNCTURED VEHICLE TIRES—OTHER DEVICES OF MORE OR LESS MERIT

CHILDS' SPEED-CHANGING DEVICE

Letters Patent No. 646,803 to Eugene Childs of Boston, Mass., assignor to Edward O. Ely, same place.

This is a speed-changing device in the design of which a great amount of ingenuity has been displayed, although it appears to be rather too complicated to be thoroughly practical in the form in which it is shown in the patent specifications. It can doubtless be simplified, however, and made practical.

One of the remarkable features of the patent is the number of claims allowed, there being no less than fifty.

From a given maximum in a forward direction to a given lesser maximum in a backward direction, every degree of speed can be obtained, or the engine may be allowed to run without imparting motion to the vehicle. In accomplishing this result, Mr. Childs employs two friction discs and a friction wheel, auxiliary to the more important differential gearing. However, the greater number of the claims allowed refer only to the friction discs and wheel, as used in a motor vehicle and the methods of maintaining them in their proper positions of contact, and these claims may interfere seriously, in the future, with other inventors and constructors who desire to accomplish variable speed through friction devices alone.

Referring to the illustrations, Fig. 1 represents a plan view of the device, in which 13 is the rear driven axle of the vehicle, 12 a frame holding this axle and the transmission gearing. The longitudinal motor shaft is shown at 14, fitted with cranks for connection with the engine. Power is transmitted from this shaft to the transverse shaft 18 by means of bevel gear wheels. This shaft 18 ends in a differential gear contained in a cage 33, which may, for the present, be considered to be held normally stationary, in

which case the power transmitted to the shaft 18 (as shown in Fig. 1) is reversed in the shaft 16, also attached to the differential gear, and is transmitted by sprocket wheels and chain to the rear axle 13, driving the vehicle forward, at normal speed.

As seen so far, the power is transmitted uniformly. From the left hand end of the motor shaft 14, however, power is transmitted to the shaft 41, by sprocket wheels and chain, and on the end of this shaft 41 is a friction disc 40 (see Figs. 1 and 2). Also from the shaft 18 is transmitted by bevel gear wheels, power to the shaft 41' on the end of which is the friction disc 40'. These discs, it will be seen, revolve in opposite directions as indicated by the arrows in Fig. 1. Between them is a friction wheel 50. Provision is made for holding the friction discs in proper contact with the friction wheel, in a manner not necessary to show here, but which is well covered in the patent claims.

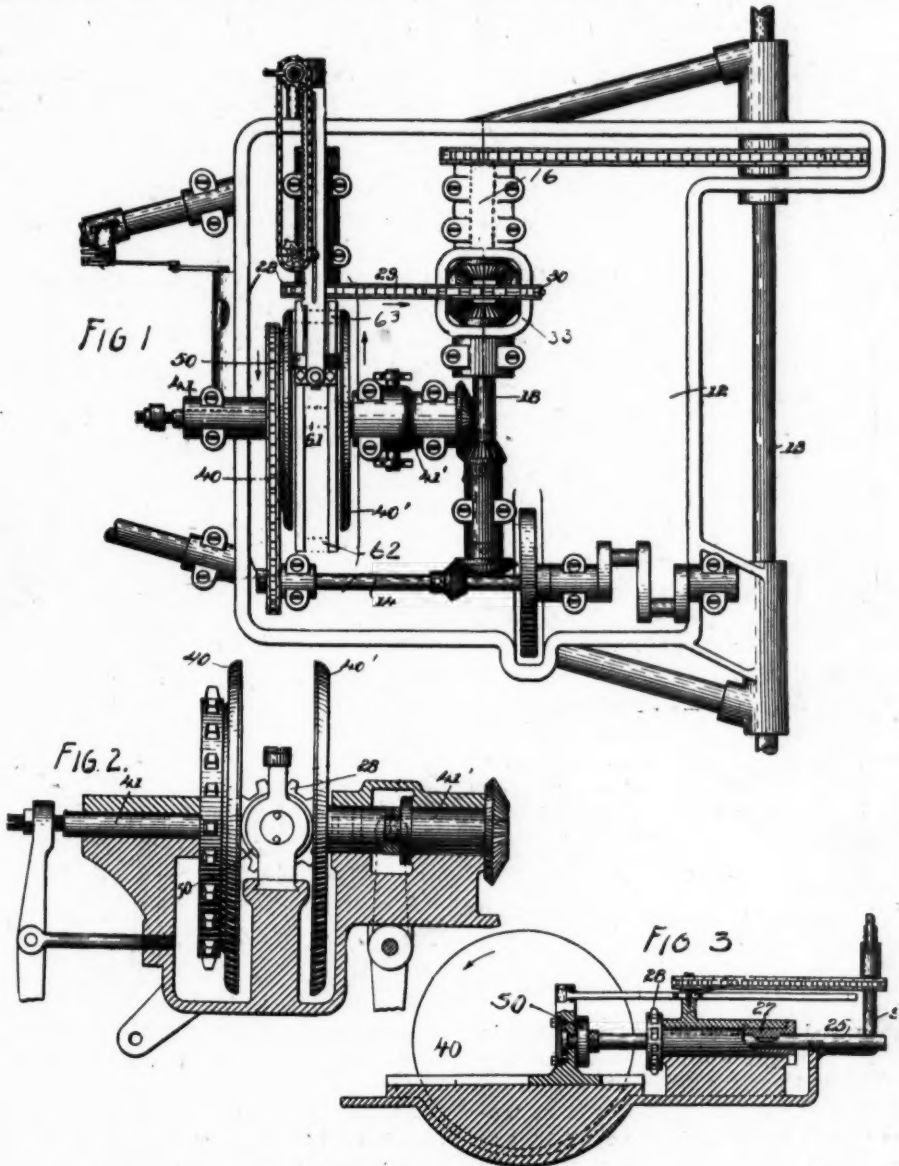
The friction wheel 50 is on the end of a shaft 25 (see Fig. 3) which is carried in a sleeve 27, in which it is slidably movable, but which sleeve, 27, revolves with the shaft 25. On one end of the sleeve 27 is a sprocket wheel 28, connected by the chain 29 (see Fig. 1) to the sprocket wheel 30 on the cage 33, containing the differential gear of the shafts 18 and 16. By means of sprocket wheels and a rack and pinion, the shaft 25 is made to slide in the sleeve 27 (see Fig. 3) in such a manner that the friction wheel 50, on the end of the shaft 25, is made to move diametrically across the faces of the friction discs 40 and 40'.

Examining the workings of the mechanism, it will be seen that when the friction wheel 50 is in the center of the two friction discs 40 and 40', as indicated by the dotted lines 61, no motion will be imparted to it and it will hold the shaft 25,

the sleeve 27, the sprocket wheel 28, the chain 29, the sprocket wheel 30 and the cage 33, containing the differential gearing of the shafts 18 and 16, all stationary, and the power transmitted to the shaft

vehicle and drives the carriage in a forward direction.

If, however, the friction wheel 50 be placed in any position between the point indicated by the dotted lines 61 at the



CHILD'S SPEED CHANGING GEAR.

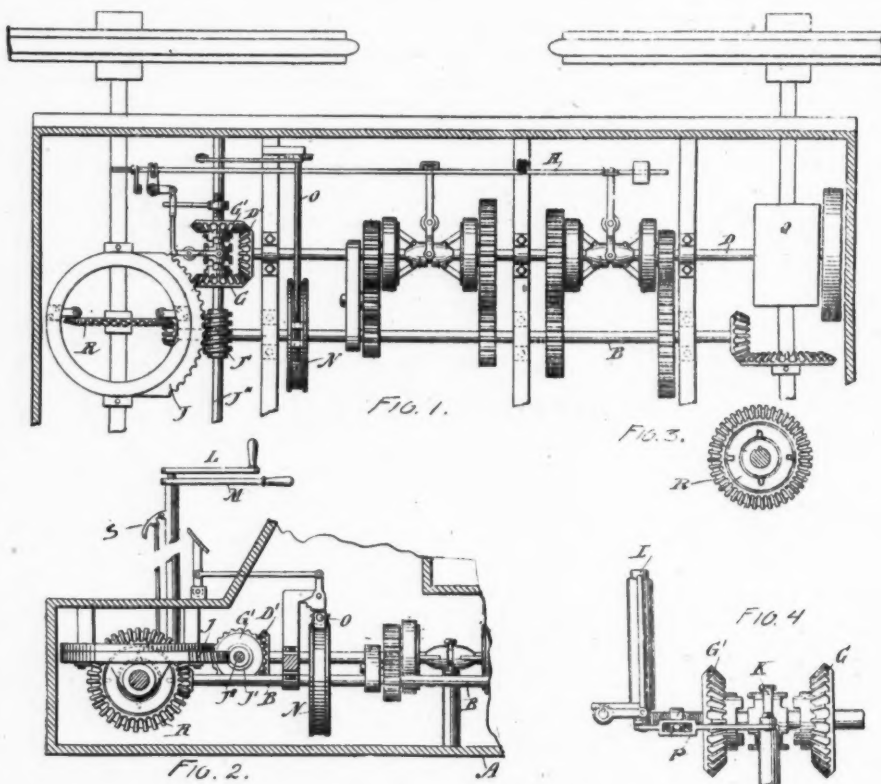
18 will be transmitted through the differential gear, in an opposite direction to the shaft 16, and thence to the shaft 13 which carries the traction wheels of the

center of the discs 40 and 40' and the point indicated by the dotted lines 62 at the periphery thereof, motion will be transmitted to the friction wheel 50 and

by it, through the gearing to the cage 33, in such a direction that the shaft 16 will have a greater speed than the shaft 18.

On the other hand, if the friction wheel be shifted from the point 61 to the point where it is shown to be in Figs. 1 and 3, the speed imparted to the cage 33 will be in an opposite direction and the shaft 16 will, in consequence, have a motion slower than the shaft 18 and the speed of the vehicle will be diminished, until the fric-

tion wheel reaches the point indicated by the dotted lines 63, on the periphery of the friction discs 40 and 40', is reached, when the shaft 16 will reach its maximum speed in the direction of the shaft 18 and the vehicle will receive its greatest speed in a backward direction.



TWYFORD'S TRANSMISSION GEAR.

tion wheel reaches the point shown in the illustrations when the speed of the cage 33 will be just sufficient to neutralize the speed of the shaft 18 and no motion will be imparted to the shaft 16, and the vehicle will remain at rest while the engine is still going.

If the friction wheel 50 be moved farther towards the dotted lines at 63, it will impart a sufficient motion to the cage 33 so that the power of the shaft 18 will be transmitted to the shaft 16 in the same

TWYFORD'S TRANSMISSION GEAR

Letters Patent No. 646,477 to Robert E. Twyford, Pittsburg, Pa.

Mr. Twyford's invention provides a means of transmitting the power of a motor vehicle through all four of the wheels of the vehicle and of steering by aid of the motive power. Fig. 1 shows a plan view, and Fig. 2 a side elevation of the transmission and steering.

Q is the motor and D the motor shaft carrying four pinions of varying sizes

each of which meshes with a corresponding pinion on the countershaft B. The forward pair of pinions have an idle pinion interposed between them to reverse the motion. The pinions on the shaft D are loosely mounted and revolve with the shaft only when held thereto by a friction clutch. The four friction clutches are governed by two levers and the two levers are, in turn, governed by a single rod H. This rod H is given either a reciprocating or a revolving motion, by means of the levers S and M (see Fig. 2). The latter engages one of two loops on the shaft H with one or the other of the levers and the latter throws one of the friction clutches which it governs into gear when the shaft H is given a forward motion and the other into gear when the shaft H is given a backward motion. In this manner the three forward speeds and one backward are transmitted to the shaft B.

The rear of the shaft B is fitted with a bevel pinion which meshes with a similar bevel pinion on the rear axle. The forward end of the shaft B is also provided with a bevel pinion which meshes with the bevel gearing on a ring R, shown in detail in Fig. 3.

Interposed between this ring R and the front axle is another ring carried in pivots from the ring R and other pivots from a shoulder on the front axle, in the manner shown in Fig. 3 and making, thereby, a universal connection. The ring B is maintained in mesh with the bevel pinion on the countershaft B by means of two rollers (see Fig. 1), supported on a fifth wheel J, the entire front axle being turned in steering. The universal connection permits the transmission of the power to this front axle when it is thrown out of parallel with the rear axle.

A band brake is provided on the countershaft B at N, being actuated by a rod O which is provided with a right and left hand thread at one end to tighten or release the band and with a small pinion at the other end, which pinion is actuated by a toothed quadrant which is governed, through a connecting rod, with a foot lever, as shown in Fig. 2.

The steering is accomplished by means of the lever L which is attached to a

vertical rod L' (see Fig. 4) at the end of which is a lever which actuates the rod P which actuates the clutch K. This clutch K throws into gear either one or the other of the bevel pinion G or G' which both mesh with the bevel pinion D' on the end of the motor shaft D. These bevel pinions turn the shaft J' and the worm gearing J'. This latter meshes with the teeth on the fifth wheel J and in this manner turns the front axle to the right or left.

To prevent too great a turning, the shaft J' is provided with an arm which is carried in worm gearing to compel the arm L to throw the clutch K out of engagement in time.

Mr. Twyford may think he can steer by the device, but he can not.

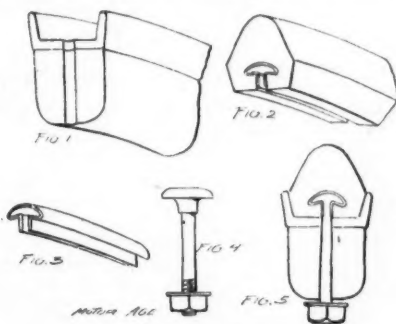
There are, however, some features of merit to his transmission device, although it is unduly complicated.

MULHOLLAND'S VEHICLE WHEEL

Letters Patent No. 464,751 to Richard Mulholland, Dunkirk, N. Y.

Mr. Mulholland's attorneys have succeeded in getting sixteen claims allowed on the tire and wheel construction, some of them of uncommon strength.

The object of the invention is to provide means for securing a rubber tire to



Mulholland's Tire Fastening.

a vehicle wheel. To that end he constructs his felly and rim in the manner shown in Fig. 1. The tire itself is shown in Fig. 2 and the retaining band in Fig. 3. Fig. 4 shows one of the bolts, a number of which are used. Their heads are inserted in the slot of the retaining band at its end and the shanks go through the rim and felly, as shown in Fig. 5. Means

for fastening the ends of the retaining band are covered in the patent.

This appears to be one of the most practical of the many devices for accomplishing this purpose that have been shown.

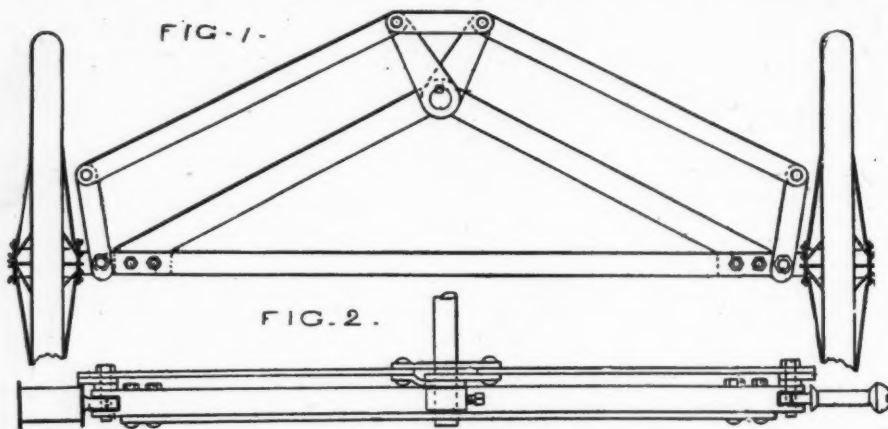
CROUCH'S STEERING DEVICE

Letters Patent No. 646,728 to Walker Lee Crouch, New Brighton, Pa., assignor by mesne assignments to the Columbia Motor & Manufacturing Co., Washington, D. C.

This patent is covered by only one rather rambling claim which affords little protection.

Fig. 1 shows a plan view of the device

in the specifications, the "invention has relation to improvements in devices for repairing punctures or other fractures in pneumatic rubber tires, and especially tires for automobiles and like vehicles, where the initial cost of the tire is such that its rejection by reason of a break or puncture involves a serious financial loss. It has been demonstrated by experience that an attempt to revulcanize the entire tire for the purpose of curing a piece to cover the puncture impairs the structure of the entire tire and renders it weaker to sustain the ordinary strain and wear of travel, and where the break is of such size that any of the ordinary means of plugging with rubber and cement are in-



CROUCH'S STEERING DEVICE.

and Fig. 2 a front elevation, from which views a sufficiently clear idea of the operation of the gear can be obtained. It does not differ in general principle from numerous other steering devices which are in general use. The one claim allowed to the patent covers only the specific method of construction shown.

SEIBERLING'S REPAIR VULCANIZER

Letters Patent No. 646,610 to Frank A. Seiberling, Akron, Ohio, assignor to the Goodyear Tire & Rubber Co., same place.

This is one of a numerous lot of patents in which Mr. Seiberling, a veteran in the tire business and the rubber trade in general, figures as inventor. Needless to say, he does not waste his energy on profitless and impossible devices.

Quoting from the preliminary remarks

sufficient the tire must be thrown aside."

The device by which Mr. Seiberling overcomes these difficulties consists of a press of suitable size and shape to hold the tire firmly. The press is made in two principal annular sections, with two smaller annular sections containing a recess to hold the valve stem. A cross section, depicted in Fig. 1, shows these four annular rings, with a tire held therein, on the line of the valve stem. The annular sections are so arranged that the valve stem can be placed in any position, relative to the recesses for vulcanizing, one of which is shown in Fig 1 as opposite the valve stem.

This recess is but one of a number, entering the lower principal annular ring and having the portions adjacent to the tire at different heights, as shown in Figs.

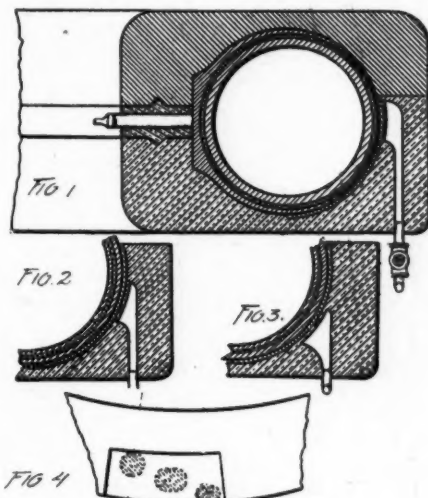
2 and 3, in order that one of them can be made to cover any small portion of the tire, and that alone.

The relative vertical and longitudinal positions of these recesses is shown in Fig. 4.

Opposite to these recesses is placed a thin, sheet-metal, detachable plate which is set in a small recess in the lower principal section. This detachable plate may be either smooth or may be made to conform to the external markings of the tire so that these markings will be left intact after the puncture is vulcanized.

In operation, the proper detachable plate is inserted in its recess, the smaller annular rings are arranged so as to accommodate the valve stem and the tire is placed in the press in such position that the puncture—having been treated with the necessary patch of unvulcanized rubber—is opposite one of the vulcanizing recesses. These recesses are connected with pipes carrying a supply of live steam and the valve to the proper recess

is opened and the live steam enters the recess and vulcanizes the puncture without affecting the appearance of the tire.



Selberling's Vulcanizer.

out affecting the appearance of the tire. Six claims are allowed.

BUFFALO COMPLETE RUNNING GEAR

The accompanying illustration shows the automobile running gear, complete with gasoline engine, transmission device, wheels and every part necessary for the vehicle except the body, the water and gasoline tanks, and upholstery and painting, that is being marketed by the Buffalo (N. Y.) Gasoline Engine Co., located at Dewitt and Bradley Streets.

The wood wheels are thirty inches in diameter with $1\frac{1}{4}$ -inch spokes. The front axle is provided with knuckle-joints of such construction that the axes of the steering bearings set very close to the centers of the wheel hubs, as may be seen by reference to the illustration. Ball bearings are provided for both front and rear wheels. Both axles are $1\frac{1}{8}$ inches in diameter. The rear wheels are fitted with sprocket wheels, connected by chains $\frac{1}{2}$ inch wide and of one-inch pitch, to either end of a counter-shaft on which is the

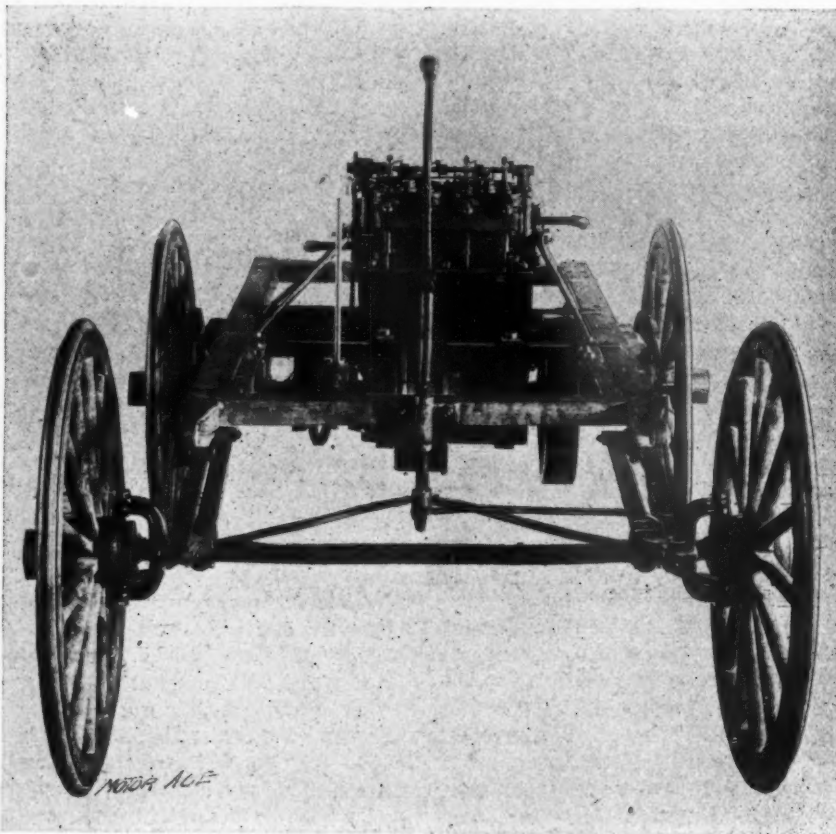
differential gear. Four elliptical springs are provided, on which is set a well ironed frame for carrying the body. A compact speed changing gear is also provided which gives two speeds forward and one backwards. The changes of speed of the vehicle do not, however, depend on this gearing wholly. Under ordinary conditions the high speed is used from which a large variation can be obtained through the engine, as will be explained further on. Only where it is necessary to develop high power with low speed, to climb grades or traverse heavy roads, is there any necessity of using the speed-changing gear, or when it is desired to back the vehicle.

The engine fitted to this gear is a four-cycle, four-cylinder, upright gasoline engine, made by the company, and is designated as a "non-vibrating" engine, an appellation which it fully justifies. The

four cylinders are placed side by side and are water-jacketed, the pistons working, of course, on the same crank-shaft. Two cranks are set at 180 degrees, giving a practically continuous impulse, from one after another of the four pistons. The igniters are made with heavy bearings and have platinum points. They are actuated by four cams set on a shaft running across the tops of the four cylinders,

tion of a sleeve at one end of the cam shaft, which sleeve is provided with a diagonal slot in which rests a pin integral with the cam shaft, the position of the cams can be advanced or retarded in their revolution, relative to the sprocket wheel on which the chain runs, thus advancing or retarding the ignition.

The crank shaft is enclosed in a dust proof casing which contains an oil bath.



BUFFALO RUNNING GEAR WITH FOUR-CYLINDER GASOLINE MOTOR.

the shaft being impelled by a chain from a counter-shaft, which latter has a two-to-one reduction from the motor crank shaft.

A mixer is provided which serves for all four cylinders, as well as an excellent muffler. The starting can be accomplished by a quarter turn.

The most commendable mechanical feature of the engine is the novel method of shifting the spark. By the introduc-

The shaft is provided with a flywheel of sufficient weight to insure constant torque even when the engine is working at its minimum efficiency. An efficient band brake is provided.

The shifting spark will give the engine a speed varying from 100 up to 1,500 revolutions a minute and is capable of driving the vehicle at a speed anywhere from a crawl up to thirty miles an hour.

A representative of the Motor Age,

during a visit to the Buffalo factory late last February, enjoyed the privilege of inspecting the factory methods employed by the company and can conscientiously commend them highly. Aside from the ingenuity displayed in designing the engine, the most workmanlike methods were pursued.

An engine like the one described in the foregoing was fitted to a light runabout and in it Superintendent Charles G. Annesley and the writer took a ride of considerable duration, during the course of which Mr. Annesley gave a demonstration of control at all sorts of speeds that was nothing short of marvelous for a gasoline driven vehicle. This was the more noteworthy when it is considered that the gasoline tank held only a small remnant of the hydrocarbon, which, as everyone knows, is not inductive to the best results. At the time the roads were covered to a depth of about four inches with very wet snow. As a pleasure, the ride was not what could be pronounced a complete success, but as a demonstration of the capabilities of the engine it was all that the most exacting could ask.

The complete running gear, as described, lists at \$470, a very reasonable

price. If pneumatic tires are desired, the price is \$490.

The company advertises the motor as "best in any country," and are not alone in their opinion.

In addition to the various parts, which have been described, and which are sold separately, the company also makes gasoline engines for motor-vehicles and launches of one, two, two-and-a-half, three, four-and-a-half, six and eight horsepower. Those below four-and-a-half horsepower are single-cylinder engines, either horizontal or upright; the larger sized are four-cylinder engines and are furnished either horizontal or upright.

Manager Langan is at present kept more than busy in enlarging the capacity of the factory to keep pace with the increasing number of orders.

One could not make even passing mention of the company without saying a word about one of the enthusiasts in the office who shows a remarkable knowledge of all features of automobilism and who is able to discuss the mechanical side thereof with an intelligence that is seldom met. The strange thing about it is that this person is a lady, Miss Clara M. Singer.

AUTO CLUB'S GOOD ROADS BANQUET

New York, April 8.—Last Monday night at the Waldorf-Astoria the Automobile Club of America entertained at a banquet Gen. Nelson A. Miles and his fellow members of the volunteer commission on the feasibility and desirability of a national highway from the Atlantic to the Pacific.

Vice President George F. Chamberlin presided, and seated with him at the head table were General Miles and Francis E. Stanley, Newton, Mass.; Col. Peter Michie, United States Military Academy; Col. Richard L. Hoxie, United States Engineer Corps; Col. Samuel E. Tillman, United States Military Academy, and Col.

John Jacob Astor, who comprise the commission.

Vice President Chamberlain said in part:

This club has always, from its very organization, recognized that the future use of the self-propelled pleasure vehicle in this country will be largely a question of good roads. The charter of the club expressly provides that one of its principal objects and purposes shall be "to promote and encourage in all ways the construction of good roads and the development and improvement of highways." The club is proud that it has been able already to awaken some public sentiment along this line, its first official publication having been entitled "A

Plea for Good Roads." When, therefore, it was proposed that the first dinner of the Automobile Club of America should be in honor of the distinguished gentlemen composing the commission, who are to make a report on the project of a transcontinental highway, every member felt that our association, of all others, was most vitally interested in the magnificent enterprise. We would not suggest to whom belongs the honor and credit of having proposed so great and so glorious a plan as the proposed roadway. The author of a recent and most inspiring article on the national highway modestly disclaimed any originality for the idea. As early in our country's history as 1800 a small beginning was made in the actual construction of a system of national highways. But the advent of the railroad and subsequent financial difficulties put an end to the splendid plans of our forefathers. The year 1900 now witnesses the beginning of a new movement toward the realization of the vast and magnificent project which we are to informally discuss this evening. The commission here tonight is freely giving its time to the serious consideration of the various problems involved, and its report will mark the first important step in this great enterprise.

After gracefully acknowledging the honor done him and the commission Gen. Miles said:

"Every one who knows the history of the country knows that the great continental railways were not built altogether for commerce, but to develop the ties that bind the west to the east. The great continental railways were constructed to establish order, and to provide that each state should be a part of one great country; they were built not alone for commercial interests but for the higher, grander and glorious purpose of welding the east to the west."

Going on to speak of the proposed national highways, General Miles said the commission had devoted itself to considering the best routes for connecting the great centers of activity with each other. The commission had thought, he said, of a highway along the Atlantic coast from a point as far north as Portland, Me., to as far south as New Orleans or St. Augustine. Then branching at some important point from this road, the commissioner had thought of a highway which would extend to the Pacific coast. Personally he was inclined to agree with those who contended that it should start

at New York, inasmuch as that city was the metropolis of the east. The route of the road, General Miles suggested, should go through Chicago, then it might strike St. Louis, continuing through Kansas City or Omaha, over the mountains to Ogden and then to San Francisco. "It will be only a short time," the General added, "before you will be able to ride on your bicycle or automobile from coast to coast."

The following resolutions were adopted unanimously:

Resolved, That the route presenting the most feasible line for a national highway from the Atlantic to the Pacific seems to your committee to be between the 40th and 42d parallels of latitude. This embraces Boston, from which the route could be stretched east to Portland, Me., then Albany, reached by a great highway from New York, Philadelphia, Baltimore, Washington, Richmond, Charleston, Savannah and St. Augustine. From Albany running west through Syracuse, Rochester, Buffalo and Niagara Falls; through Erie, Pa.; Cleveland and Toledo, O.; Adrian and Coldwater, Mich.; Elkhart and South Bend, Ind.; from Chicago, Ill., to Davenport, Des Moines and Council Bluffs, Ia.; through Omaha, Lincoln and Hastings, Neb., starting across the Rocky Mountains at Denver, reaching Salt Lake, and thence southwestwardly to Sacramento and San Francisco, a southern line reaching thence to Los Angeles, and a northerly one to Portland, Ore., and Seattle, Wash.

Resolved, That in view of the military importance of such a highway, and of the advantages to those sections through which it would be built, and, furthermore, in view of the example in good road building it would give to the people of twenty-five states and territories, through which it would pass, the matter be brought prominently to the attention of the people of the twenty-five states and territories concerned, in order that Congress may be petitioned to authorize the preliminary surveys required for such national highway; providing, if possible, for the completion of the survey of the section between Boston and Chicago the first year, that between Chicago and Omaha the second year, that between New York and St. Augustine the third year, and the remaining sections within the following year.

Resolved, That it be suggested to the petitioners to prepare the completion of the national highway by an appropriation for one-third the expenditure required from the congress of the United States, one-third from the states for those portions lying within their respective boundaries, and one-third by the counties, townships and cities

through which the road shall pass, while the owners of all property benefited be asked to donate the right of way.

It is the further opinion of the committee that, in view of the rapidity of motion which science is substituting for the slower forms of roadway travel, and in view of conditions which many recent tests upon the great highways of France and England have already made clear, two points should be kept in mind with reference to construction: First, ample width, and second, the avoidance of curves. One hundred and twenty feet is shown in the boulevard which Massachusetts has built leading out of Boston, to be not too great a width. One-half of this width might be built in the first instance, but by all means should the entire right of way be secured. The impossibility of avoiding collisions between carriages moving rapidly around curves calls attention to the necessity for long, straight lines in a way that did not present itself in the earlier days of highway engineering.

Ex-Mayor William L. Strong, Julian Hawthorne, Col. John Jacob Astor, M. Verdery, Col. Pope, Isaac B. Potter and Rev. H. M. Sanders also made addresses.

Among others present were: A. R. Shattuck, Gen. George Moore Smith, Maj. P. B. Strong, William Leary, Dave H. Morris, John H. Flagler, Albert C. Bostwick, Leonce Blanchet, V. Everit Macy, George Isham Scott, Edwin W. Adams, J. Q. Jimenis, Jefferson M. Seligman, J. S. Bache, Amzi L. Barber, W. H. Johnson, Walter E. Frew, S. S. Wheeler, A. R. Hawley, Whitney Lyon, J. M. Ceballos, E. S. Jaffray, Charles J. Canda, Rev. E. N. Potter, Rudolph Walker, David S. Walker, P. Farrelly, Col. Edgar Bass, Charles R. Flint and Stephen Farrelly.

GREAT NICE-MARSEILLES RACE

Paris, March 28.—The week's automobile festivities at Nice, which were scheduled to begin on Sunday, the 25th, opened auspiciously on that day, but the race to Marseilles and return, which was to have been the greatest feature of the meet, was practically spoiled by the wretched weather of Tuesday. The run to Marseilles which took place on Monday was all that could be asked by the most exacting, but the rain of the second day prevented its being finished by more than one lone chauffeur.

The programme for the week embraced the assembling of the automobilists at Nice on Sunday with a parade at 2 p. m., which was an unqualified success, being largely attended. The vehicles were handsomely decorated with flowers and banners. The features scheduled for Monday were the start of the big race, the contestants going only to Marseilles the first day, a distance of 123 miles, and the fast tour to Draguinan, starting after the speed merchants had left. On Tuesday the tourists were to return to Nice in time to see the return of the race.

On Wednesday is to occur a motor-vehicle exhibition at the club house of

the automobile club of Nice. On Thursday an exhibition of vehicles in action on the mile track at Nice. On Friday, after an inspection of the gas works, the start of a race of twenty kilometers, up the steep grades to La Turbie, near Monte Carlo, where an illuminated parade is scheduled for the evening. On Saturday there will be another hill climbing race, the Esterel, in the same neighborhood.

On Monday the race started under favorable conditions. Unlike the earlier race of the season at Pau, it was not one-sided. Rene de Knyff was again the winner in sensational time, but he was followed closely by Gilles Hourgieres and Charron, who had alternated with each other in the lead during a large part of the race. And, what is the strangest feature of the whole day's racing, Beconnais, although finishing in fourth place on his tricycle—owing to the fact that the motorcycles were started after the voitures—made the fastest time of all.

Several German machines were ridden in the race, but none of them made any notable showing.

De Knyff finished the 201 kilometers (123 miles) in 3 hours 25 minutes and 30

seconds, followed by Hourgieres, whose time was 7 minutes and 31 seconds slower, while Charron's time was only 59 seconds slower than that. The previous record for the course, made by Charron in 1890, was 6 hours and 53 minutes. The time occupied by De Knyff was less than half of this.

Beconnais, in his motorcycle class, scored a more decisive victory, being 21 minutes ahead of Teste, the second moto-cyclist. Beconnais, however, made the fastest time of any of the competitors, covering the distance in 2 minutes and 19 seconds faster time than even De Knyff, or 3 hours 23 minutes and 11 seconds. At Pau the motorcycles were far behind the heavier vehicles.

The start of the race was an inspiring sight, the vehicles being all drawn up in line in the boulevard of the public gardens at Nice. The thirty horsepower car of the Duc de Levegh and the voitures of Rene de Knyff and Koecklin attracted the bulk of the attention.

While waiting for the word a curious accident happened. De Knyff's car was standing alone beside the sidewalk with the gearing in engagement, the ignition tube hot, but the engine at rest. The voiture of Hourgieres, coming up behind, ran into De Knyff's car and gave it just enough start to set the engine to going, and what might have been a dangerous runaway was prevented only by the car coming into contact with some trees and being stopped before it was fairly started.

Several more serious accidents occurred during the course of the race, one rider being thrown from his voiture and into a ditch of water, where he was pinned by the carriage and would have been drowned if some spectators had not come promptly to his rescue. None of the chauffeurs were, however, seriously injured.

The following table gives the time made by the contestants in the voiture class:

1. Rene de Knyff	3:25:30
2. Gilles Hourgieres	3:32:01
3. Charron	3:33:00
4. Pinson	3:44:32
5. Levegh	3:49:37
6. Boson de Perigord	3:52:47
7. Girardot	3:52:53
8. Koecklin	3:59:35

9. Laboure	4:51:32
10. Mercedes	4:52:49

The time made by the moto-cyclists was as follows:

1. Beconnais	3:23:11
2. Teste	3:44:25
3. Marcellin	3:46:11
4. Joyeux	3:51:32
5. Bardin	3:52:20
6. Gaste	4:25:05
7. De Meaulne	4:26:40
8. Baras	4:52:00
9. Allegre	5:00:07
10. Bertin	5:18:00
11. Cavasse	5:27:15
12. Ducom	5:75:58
13. Bonnard	5:46:33

This, however, was only half of the race, the other half to be run the next day, Tuesday. But when Tuesday dawned, what promised to be an even more exciting day's racing than that of Monday was ruined by a deluge of rain. Of all those who finished the first day's run, only seven made the start the second day, four in voitures and three on tricycles, and of the seven only one, G. de Meaulne, finished, and he took 7 hours and 26 minutes to do it, 3 hours longer than he took the day before. The others all gave up the contest in disgust.

The judges finally decided that, as Meaulne was the only one who had complied with the conditions of the race, he should be given the first prize in the motorcycle class. As none of the competitors in the voiture class finished at all, the order of finish for the first day was allowed to stand as that of the race, thus giving De Knyff the first prize.

A CHAUFFEUR DANGEROUSLY INJURED

Paris, March 31.—The week's meet at Nice was marred yesterday by the terrible accident that occurred to M. Braun, a German and one of the most noted chauffeurs of Connstatt, who had suffered a slight accident at Frejus. Yesterday's accident occurred in the race from Nice to the village of La Turbie. The course is up stiff grades for the greater part of the distance. As M. Braun, with a companion, was attempting to pass another companion in a turn of the road, the rear wheels of his vehicle skidded, the vehicle struck a large rock and the two occupants were thrown out. Mr. Braun's companion escaped without

serious injury, but the driver himself struck on his head, cut a great gash in it and was rendered unconscious. His companion and some spectators carried him to shelter, where he lay for a long time while his friends expected his death every minute. At the present writing he has a remote chance of recovery, although he sustained a severe concussion of the brain. The accident has thrown a veil of gloom over the festivities. While those in charge of the races are, in no manner, blamed for the accident, it has given rise to a deal of talk about the necessity of selecting courses for future automobile races which comprise no sharp turns.

As said, the course is up hill for the very great part of its distance, twenty kilometers. The hills surrounding La Turbie and Monte Carlo command a view of the road for almost the entire distance and the heights were crowded with spectators who were worked up to a high pitch of excitement.

The victor turned up in the person of Duc de Levegh, whose specially constructed vehicle has been an unknown quantity before this. It is very light compared with the other powerful racing cars, and this feature is evidently responsible for the winning of the race by the duc. Charron was second in only 15

seconds slower time, while De Knyff was fourth, more than a minute behind Charron.

The following is the order of finish of the voitures:

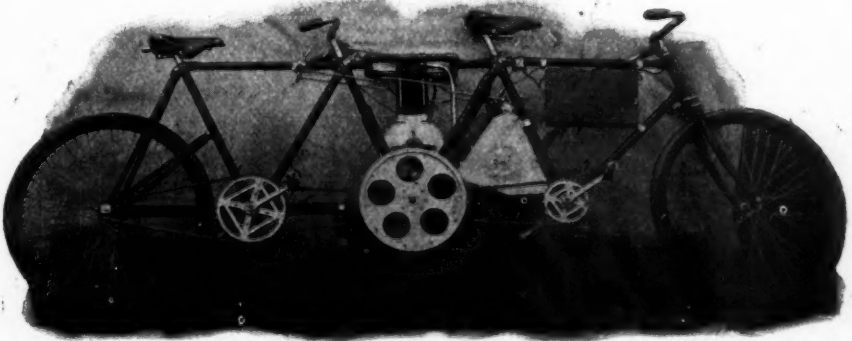
1. Levegh	19:02
2. Charron	19:15
3. Girardot	19:59
4. Rene de Knyff	20:21
5. Gilles Hourglères	21:12
6. Pinson	23:55
7. Koechlin	37:45
8. Laboure	39:50

Among the motocyclists there were numerous accidents. Beconnais stripped a pinion while he was ahead of Levegh, and Baras broke a valve. Marcellin, the winner in the motorcycle class of the Pau race, rode a quadricycle and came in second in the motorcycle class but more than a minute behind Gaste, the winner. The following is the order of finish of the motocyclists:

1. Gaste	20:10
2. Marcellin	21:16
3. Tart	22:40
4. Bonnard	25:30
5. Fernandez	28:52
6. Baras	30:23
7. Beconnais	37:20

There were also voiturette and tourist classes, in the latter of which Leibig won in the first voiture built in Austria.

At some points in the race, several of the competitors rode down grade at a speed in excess of fifty miles an hour.



TANDEM PACING MACHINE NOW IN USE IN AUSTRALIA.

MOTOR-STAGES DE LUXE

A LINE OF OMNIBUSES TO BE RUN IN NEW YORK ON WHICH A TEN-CENT FARE WILL BE CHARGED AND FROM WHICH ALL "OBJECTIONABLE PERSONS" WILL BE EXCLUDED

New York, April 8.—New York will soon have autostages de luxe, with 10-cent fare, running up Fifth Avenue, through Central Park and up the Riverside Drive. Six of these stages are now in course of construction and will be in operation by July 1.

The autostages will be double-deckers, seating twenty-two passengers, with a spiral staircase in the rear very much like that of the London busses. Standing passengers will be limited to two or three, so that no one will have to stand more than a few blocks, owing to seats being afforded by passengers dismounting.

May Have Crosstown Lines

It is probable that cross-town connecting lines will be established later, running to the principal ferries and traversing the main cross streets.

The new line will be run by the New York Transportation Co., a sub-company of the Electric Vehicle Co. President Robert MacAllister Lloyd of the latter company told yesterday some of the things it was proposed to do with automobile stages:

"While we are not making any large promises to the public," he said, "it is our purpose to do all that the business of the stages warrants. In the beginning our trunk line will be Fifth Avenue. Stages will be run from Washington Square up Fifth Avenue to Seventy-second Street, thence west on Seventy-second to Riverside Drive, and out Riverside Drive to One Hundred and Twenty-fifth Street. This line will tap a section that is practically without nearby transportations, and it ought to prove profitable.

Route of the Stages

"Some of the buses will be run up Fifth Avenue as far as Twenty-fourth Street, and east on Twenty-fourth Street to Madison Avenue, thence north to the

present terminus of the Fifth Avenue stage line."

Mr. Lloyd was asked if he thought the ten-cent fare would shut many people out.

"No," he said. "For ten cents the company offers transportation in a luxurious bus, in which no objectionable persons will ride. The curb-to-curb feature makes the fare reasonable. We consider that the stages will, too, be used as largely for pleasure riding as for business journeys.

Like to Ride on Top

"Don't you know that almost everybody likes to ride on top of a stage or bus, whichever you may call it? Now, our buses will be very like those in use in London—all double-deckers. The seats will be so arranged that there will be no crowding.

"There are many thousands of people who live long distances out who will ride in the tunnel. There will be other thousands who will prefer the elevated. Still more will favor the trolley lines. The stage company will not expect to get those people. It is willing to forego any great custom from what is called long-haul traffic. The money is in the short haul."

Other Prospective Routes

"Do you intend to cater to any other class of patronage than that of the residents along the line spoken of or that business may take there?"

"That would depend altogether on the volume of traffic. Fifth Avenue is sure to become a great business street. Again, it is quite likely that some of the stages will run to the Twenty-third Street ferry, traveling in West Twenty-fourth Street to the river."

When it was suggested that this was paralleling the Metropolitan Co.'s Twenty-third Street line, Mr. Lloyd said:

"Oh, that will not make any difference. Our relations with the Metropolitan are

so close that there will be nothing in the way of competition. In fact, if business warrants it, the company will put electric stages on all the cross streets where there seems to be a demand for such transportation."

"Will there be a transfer system?"

"That matter has not been settled as yet. The stages will all start from a given point at the southern terminus, but the matter of any interchange of passengers between stages that take different routes after they reach different points on Fifth Avenue is a problem to be solved in the future.

High Class Transportation

The object of the company will be to give a higher class of transportation facilities, so far as comfort is concerned,

than can be enjoyed on either the surface or the elevated roads as they exist today. Compared with the latter, it will be luxurious, and people are always expected to pay for luxuries. We shall have six buses ready about July 1, and within a year from that time seventy-five more.

"I believe there is a great field in New York city for just such a transportation system as we have organized. And I want to say that so far as the ten-cent fare being a drawback or in the nature of an imposition, any fair-minded person, after looking the situation over, will admit that that fare is no more than just. There will be no objectionable people riding. We shall discriminate as regards passengers to that extent."

TO AND FROM EDITOR AND READER

THE EDITOR IS CORRECTED

Editor of Motor Age:

After reading the libelous article of yours of March 29 concerning one Ingersoll, and his "pipe dream," yclept in this benighted locality "The Senseless Age," the writer was fain to bow down his head and weep that you should have foolishly devoted so many sticks-full of good solid reading matter to the aforesaid gentleman. Your six columns of cold, cruel, cynical, cantankerous contumely were wasted—yea, worse than wasted. The victim of your unseemly wrath has been provided by a kind Providence with a hide of a pachyderm (as well as the brains of one), and such verbal sky-rockets will merely roll off him like water from the proverbial duck's back.

It gives me deep pain that you should have so misunderstood Mr. Ingersoll and his journal. You have taken him seriously, which is dead wrong, as he never does this himself. His paper is a humorous publication (barring the patent office reports), and as such deservedly ranks with *Life*, *Puck* and *Judge*. The delicious part of Mr. Ingersoll's humor is that it is so entirely unconscious and spontaneous.

Professional humorists say that being funny for a living is much harder work than carrying the hod, and on this account many of them die of brain fag, and things. If Mr. Ingersoll lives until he dies of this ailment he will reach a ripe old age that would make Methuselah feel like thirty cents. Mr. Horseless Ingersoll's humor is of a style peculiarly his own. Most of his articles are just bubbling over with mirth, but it is not visible to the careless scoffer who carelessly glances over the precious pages. Like gold and precious jewels, it has to be dug out. Probably the reason why you never "tumbled" to the above was because you are only familiar with the old "mother-in-law," "spring poet" and "hayseed" jokes of the other funny papers and don't recognize a good joke when you meet one. Mr. Ingersoll's methods of work bear the professional funny men's trademark, but he is decidedly more original; he rings the changes on the "lead cab," "the deadly storage battery" and the "discredited expert," instead of the ordinary humorist's stock in trade mentioned above. Wot t'ell?

A gentleman by the name of Brann once attempted to run a humorous paper

on the lines of the Senseless Age, down in Texas, not so long ago, but the fickle public didn't seem to appreciate his efforts. After a short but exciting career he died suddenly of an acute attack of lead poisoning (at least, I believe that's what the coroner's jury called it). The joke was on him. This being the case, is it any wonder that Mr. Gingersoll is down on lead in any form? Honest now, can you blame him?

Now that I have shown you the error of your ways, I hope that my warm and entirely disinterested defence of Mr. Ingersoll and his work of art may sink deep into your manly bosom and that you will be ashamed of yourself for your idle jests at one who is indeed a benefactor of humanity. He who brings one smile forth where none has bloomed before is greater even than a common councilman, and a bevel-gear, self-playing harp and nickel-plated, full-jeweled crown awaits him in the realms above.

One of the writer's chief pleasures in life is to await each week the coming of the Senseless Age, that he may revel in its keen, dry wit, and the priceless knowledge which it contains. Would you, oh would you, be cruel enough to deprive me of this innocent pleasure? The bare thought is so fraught with horror that I will hie me this instant to yon saloon where I may drown my shuddering apprehensions in a glass of the insidious sarsaparilla.—Wm. D. Chalmers, 1126 North Broad St., Philadelphia.

The editor of the Motor Age is obliged to reluctantly confess that his intellect was not of the caliber to appreciate the humor in his esteemed (now) contemporary, but since reading the foregoing communication a light has dawned upon him. The delicate humor of marking one feed pipe in a gasoline engine with the two legends, "air pur" and "cold air," as in the latest issue, to hand, with other idiosyncrasies of the intellect, begins to be appreciated.

AUTOMOBILE CLUB MEMBERSHIP

Editor The Motor Age:

Is it necessary to own and operate an automobile to become a member of the

Automobile Club of America? What are its provisions concerning membership of persons not residing in cities having local branches of the club?—C. E. Pickering, Los Angeles, Cal.

The objects of the club, as set forth in its charter are, in part, "the formation of a social organization composed in whole or in part of persons owning self-propelled vehicles for personal or private use." The constitution and by-laws limit the active membership to 400. In no other manner is it limited. The associate membership is limited to those who reside more than fifty miles from the city hall of New York. The dues for active members are \$50 a year, with \$100 initiation fee. The dues for associate members are \$25 per year and initiation fee \$25.—Ed.

INCANDESCENT GASOLINE LAMPS

Editor The Motor Age:

Would an incandescent gasoline light for a gasoline driven automobile be practical?—C. E. Johnson, Chicago.

If Mr. Johnson means an incandescent light after the Wellsbach principle, most certainly "No." The mantles by means of which the incandescent light of many makes of gas and gasoline burners is produced is of a very delicate construction. If he means any other kind, he is in a new field of experiments.—Ed.

WANT NAMES OF MAKERS

Editor The Motor Age:

Would like to have you send us the names of several firms who are in the automobile business. We wish to correspond with some one who has a carriage with solid tires, with a view to buying.—Siefert Bros., 34 East Washington St., Shelbyville, Ind.

Your question is too indefinite. State whether you wish a steam, electric or gasoline driven carriage, number of seats and the influence that promptness of delivery will have, and the names will be furnished accordingly.

SHOULD WIRE WHEELS BE TIED

Editor The Motor Age:

Should the spokes of a motor vehicle

suspension wheel be tied at the crossings? If so, what form of tie would you recommend.—C. L. Rogers, St. Louis, Mo.

In a motor-vehicle, a certain amount of elasticity is desirable in the wheels, and the tying of the spokes would tend to decrease the elasticity of suspension wheels. The Motor Age is not prepared to say that the spokes should not be tied, however, and invites discussion on the point. If they are to be tied, the spokes should

be secured at their outer intersections with several wraps of annealed wire and this should be hard soldered.—Ed.

WANT AUTOMOBILE PARTS

Editor The Motor Age:

We are building an addition to our factory for the purpose of building automobiles, and are in the market for parts of all kinds.—Smith Bicycle & Light Machinery Co., 37 South Mill St., Massillon, Ohio.

NEWS OF THE MOTOR INDUSTRY

FOES OF THE INDUSTRY CONDEMNED

New York, April 8.—“The lay press is doing a lot of injury to the automobile industry,” said “Joe” Brandenburg, the Oakman Motor Vehicle Co.’s New York representative, to a Motor Age man, “by filling the public full of a lot of inflated nonsense, so that many people now have an idea that all an automobilist has to do is to get into his wagon, press the button and the vehicle will do the rest until the end of time. An automobile needs attention and repair, just as a horse has to be watered and fed. I am glad to see that your paper is calling attention to the injurious stories the daily press and one of the trade papers is publishing about motor-vehicles and motorcycles at ridiculously low prices. Some of the dailies did just this thing with the bicycle business and did it a lot of injury.

“Such stories add greatly to the difficulties of salesmen. It is hard enough work to explain to a customer why automobiles should cost so much without having also to overcome these false stories of careless and ignorant writers. Abroad they have been making motor vehicles for years and yet they have not been able to reduce the cost. In this country a gasoline maker has had to raise his price from \$1,000 to \$1,200, and a prominent steam builder to increase his from \$600 to \$750. The outside public little realizes the cost of machinery and material.”

A Motor Age representative just re-

turned from a trip through New England says the trade there is also condemning angrily these injurious and ill-founded stories and is universally commending Motor Age for its criticism of the daily press and a noteworthy offender in trade journalism in this direction.

NEW BOILER SAFETY DEVICE

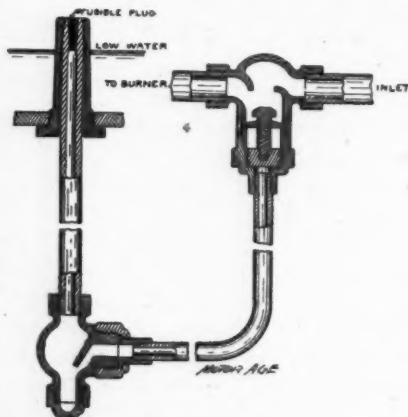
A new safety device for steam automobile boilers is being marketed by Smart & Spencer of Salem, Mass.

The device was designed by John E. Bickford, a well known mechanical and electrical engineer. The accompanying sectional view gives an excellent idea of its construction. It follows the well known practice, observed in steam plants, of providing a fusible plug, which, when the water gets too low in the boiler, burns out and allows the water to extinguish the fire. In this case, however, the burning out of the plug merely shuts off the supply of fuel.

To accomplish this end a sleeve is inserted in the lower head of the boiler, rising to a height a little more than that of the safe low water level, about two inches. The upper end of this sleeve is threaded on a taper and a small pipe, the upper end of which contains a fusible metal, is threaded and screwed into the sleeve, the taper making a steam tight joint. The lower end of this pipe is connected, as shown in the illustration, with a pocket located below the burner. From this a flexible copper pipe leads to a pis-

ton valve inserted in the pipe which conveys the fuel to the burner. The copper pipe is joined to the pocket by a half-union to facilitate the replacing of the pipe containing the fusible metal.

Should the water in the boiler get abnormally low, so as to expose the end of



the sleeve, the rise in temperature will be enough to melt the fusible metal and it will drop into the pocket below, while the steam from the boiler will pass along the same channel, and on through the copper pipe from the pocket to the piston valve, act upon this valve and shut off the supply of fuel to the burner.

This will, of course, extinguish the fire and prevent an explosion, the same as when the water is allowed to extinguish the fire of a boiler heated by coal, etc.

A deflecting plate prevents the fusible metal from getting into the copper tube and a cap at the bottom permits its removal. The piston will return to its normal position as soon as the pressure is relieved and the plug can be renewed. It is designed to provide an extra pipe containing the fusible plug so that in case of accident a pipe with a new plug can be quickly inserted and the journey renewed—of course after the water supply has been replenished. A new plug can be inserted in place of the one burned out at leisure.

The pipe containing the fusible metal is wrapped with asbestos where it passes between the bottom of the boiler and the burner to protect it from the heat.

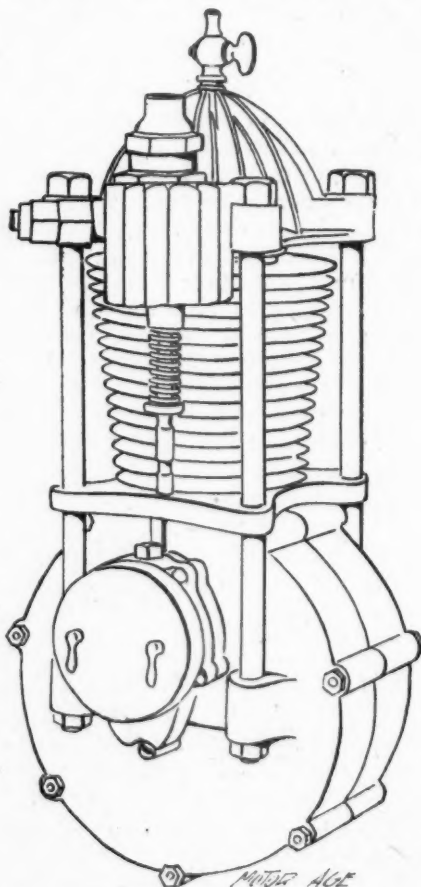
The inlet and outlet connections of the

piston valve are made $\frac{3}{8}$ -inch regularly. The safety device sells for \$10.

This or some other equally good device should be fitted to every steam automobile.

THE NEW CREST MOTOR

The Crest Mfg. Co. of Dorchester, Mass., who are well known to the automobile trade as the manufacturers of the Duplex motor, a four-horsepower, air-cooled, gasoline engine with two opposed, horizontal cylinders, which has met with a ready sale and has given excellent satisfaction, are just putting on the market an air-cooled, single-cylinder, upright engine of sufficient horsepower to make it suitable for tricycles and quadricycles or for the



lightest type of carriages. This motor has a cylinder of slightly greater diameter, according to the statement of the com-

pany, than the best American or European air-cooled motors, making it the most powerful motor of its type. The weight of the motor is seventy-four pounds and the dimensions are eighteen inches high by six wide, with a crank box nine inches in diameter. The company is now accepting orders for May delivery on this motor at a price of \$150, or \$140 in lots of ten, which price will probably be increased later on.

The Crest company has catered particularly to the wants of the small builder from their advent in the automobile business. They do not make automobiles, but pay all their attention to the building of the motors therefor. They make a point of setting their customers on the right track in building and furnish advice and designs which will enable the ambitious maker of moderate means to build a successful automobile or motorcycle without the necessity of resorting to expensive and unsatisfactory experimenting.

ACTIVITY AT TARRYTOWN

Workmen are leaving Waltham in great numbers to take positions at Tarrytown with the Mobile Co., with which E. A. McDuffee is now connected and for whom he will open a New York store. It is said that over 175 men are working in the Mobile factory.

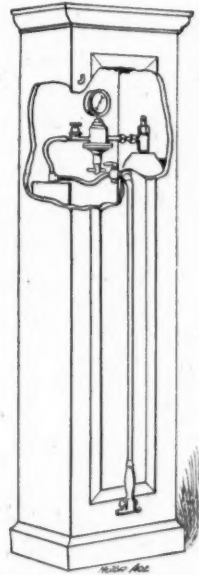
OPINIONS OF MOTORS DIFFER

There is, apparently, a difference of opinion in France regarding two motors, the De Dion-Bouton and the Aster. Harry Elkes writes to America to say that the man who secures a De Dion has the best. Elkes, by the way, is having his pacing machines made by the Jallu Brothers, who will pace him in his races. The Jallus were here in '96 with Eck and again in '98 with the International team of Senator Morgan and Tom Eck. Henri Fournier, who brought motors to this country first for use in pacing, writes to a number of friends that the Aster is the best motor. Contests in the racing world this year will be interesting, therefore, in demonstrating this fact, and opinions will change from time to time as victory

perches upon the banner of either. There is still a third motor which will be largely used, the Smith, made in Newark, and fitted to several motor tandems lately brought out, including that of McEachren and Thompson.

AN AUTOMATIC TIRE INFLATER

The automatic tire inflator which is illustrated herewith is manufactured by the Bishop & Babcock Co. of Cleveland. The general appearance of the inflator can be seen in the illustration. The pressure is derived from liquid carbonic acid



gas which is stored at a high pressure in steel drums and is conducted to the tire by means of a suitable tube, after passing through a regulator which can be adjusted to give any desired pressure up to 300 pounds. One drum of gas will inflate 500 three-inch automobile tires. The drums, charged with the gas, are furnished by the company, who have offices at 180 Washington Street, Chicago, and at 47 Great Jones Street, New York, in addition to the home offices at Hamilton and Kirtland Streets, Cleveland.

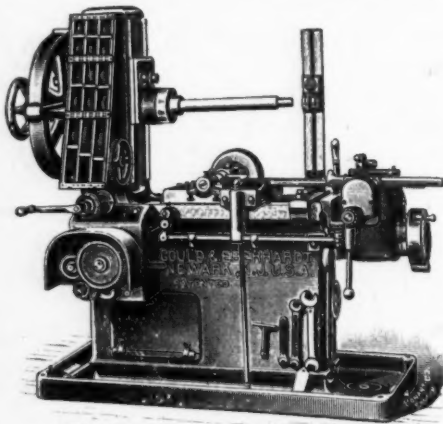
LAWSON AND THE A. B. C.

New York, April 8.—It turns out that all this talk about the American Bi-

cycle Co. having purchased the Lawson gyroscope motor and adopted it for its proposed tricycles and quadricycles, has its only foundation in Lawson's having made a contract with the A. B. C. to build some of these motors for him at the Western Wheel Works factory at Chicago. At the A. B. C. offices it is still stated that the only motor so far formally adopted by the company is the Burwell motor, invented by the mechanical expert of H. A. Lozier & Co., as has already been told in Motor Age. The A. B. C. will not confine itself to any one motor, as, at the Hartford factories, another American motor has been tested and will be used. The electric vehicles made at the Indiana Bicycle Co.'s factory are now en route for the A. B. C. automobile salesroom on Eighth Avenue in the G. & J. Building.

AN EXCELLENT GEAR CUTTER

The gear cutters made by Gould & Eberhardt, of Newark, N. J., known as the Eberhardt gear cutters, have long been known to the machinery world as among



the best that have been offered for sale. They are broadly covered by patents. The accompanying illustration shows a new type of the gear cutter, especially designed for small work such as is needed in automobile manufacture.

The construction of this machine is very simple and its work is not only thoroughly accurate but is done with great economy. The bearings are enclosed

from dirt and work in composition lined bearings which are all set in the same cast metal box, thus assuring rigidity and accuracy in work. The cutter is placed in the center of the cutter-carriage, giving a direct thrust, with a minimum of wear to the slide bearings.

There are numerous other meritorious features of which lack of space prevents mention. Automobile builders will serve their own interests by consulting with the makers of this admirable machine.

THE LEWIS COMPANY TO RETIRE

At the first annual meeting of the stockholders of the Lewis Motor Co., held April 2 in Camden, the old board of directors was re-elected and a resolution providing for the dissolution of the company was adopted. It is expected that the preferred stockholders will realize about 50 cents on the dollar, there being in the treasury \$47,000 out of the \$93,000 which was paid in. Lawyer Sparhawk, representing some of the common shareholders, objected to the resolution providing for dissolution, urging that action be postponed for sixty or ninety days.

CAPITAL STOCK REDUCED

The various cab companies of which the Electric Vehicle Co. of New York is the parent concern, have completed the necessary steps to reduce their capital stock from \$25,000,000 each to the more modest sum of \$2,500,000.

NEW CORPORATIONS

The following companies have recently been incorporated:

Holyoke Automobile Co., under the laws of New Jersey, for \$200,000.

The Automobile Car Brake & Fender Co., under the laws of New Jersey, for \$100,000.

The Edie Mac Automobile Co., of Reading, Pa., with capital stock of \$250,000.

The Anglo-American Motor Co., under the laws of New Jersey, with an authorized capital stock of \$750,000.

The British Motor Coupe Co., under the laws of New Jersey, with an authorized

capital stock of \$3,000,000. This, with the Anglo-American Motor Co., are both backed by New York capital, and, as their names indicate, their vehicles are intended for export and will be built on foreign lines.

STATE OF MASSACHUSETTS COMPANIES

Boston, Mass., April 8.—This is the season when the public has access to the statements of the financial condition required to be filed with the secretary of state by Massachusetts laws. Each corporation doing business within the state has to file these certificates of condition, whether incorporated under Massachusetts laws or not. The New England Electric Vehicle Co., a New Jersey corporation, has made the following statement of its condition on March 1, from which it will be noted that its list of readily available assets is large:

ASSETS.	
Land	\$163,350
Buildings	112,719
Machinery	52,006
Vehicles	311,638
Cash and debts receivable	1,484,063
Stock in process	2,630
Patent rights	25,000
Miscellaneous	109,353
Balance profit and loss	13,478
Total	\$2,274,236

LIABILITIES.	
Capital	\$2,242,600
Debts	31,636

Total \$2,274,236

The Boston Transit Co., formed to run lines of autobuses, has filed a statement in which it appears that the company mentioned above holds 390 shares. The cash and debts receivable of the Transit company are \$100,243.58, and its capital stock \$100,000, leaving a balance of \$243.58. This company has not yet begun to run vehicles over its granted routes.

The International Automobile & Vehicle Tire Co. filed a full report on the 5th of this month, an abstract of which is as follows:

ASSETS.	
Real Estate:	
Land and water power	\$35,000.00

Buildings	15,740.43
Machinery	75,112.10
Other Assets, viz.:	
Cash and debts receivable,	63,496.20
Manufactures, merchandise,	
material and stock in	
process	272,242.43
Patent rights	2,802,854.17
Miscellaneous	11,961.27
Balance profit and loss	111,309.72
Total	\$2,667,716.35

LIABILITIES.	
Capital stock	\$2,363,000.00
Debts	299,716.35
Total	\$2,667,716.35

The Liquid Air Power & Automobile Co., incorporated in West Virginia, makes the following declaration:

ASSETS.	
Land	\$20,000
Buildings	60,000
Machinery	25,600
Cash and debts receivable	4,333
Manufactures, merchandise,	
material and stock in process	5,000
Patent rights	1,549,500
Miscellaneous	529
Total	\$1,664,362

LIABILITIES.	
Capital stock	\$1,550,000
Debts	45,889
Balance profit and loss	68,473
Total	\$1,664,362

The Turbine Motor & Carriage Co. of Boston, a Maine corporation, states that its cash and debts receivable amount to \$5; its patent rights are valued at \$2,499,995, thus equaling the par value of its capital stock, \$2,500,000.

AUTO LINE AT KENOSHA

Kenosha, Wis., April 6.—The Lehigh Valley Automobile Co. is making another effort to get a footing in this city. E. B. Boyington, the president of the company, is trying to organize a local company with a capital stock of \$100,000 to operate a line of horseless carriages here.

There will be an automobile exhibition at Agricultural Hall, London, beginning next Saturday.

MOTOR RACING AND MOTOR PACING

FIRST AMERICAN AUTO RACE

New York, April 8.—America's first automobile road race will be run on April 14th over a fifty-mile course hereabouts—just where cannot be announced, and if it could be it probably wouldn't be until the last moment, for fear that the horse trade's friends among the dailies might start a crusade to suppress it along with other automobile matters. But "where there's a will there's a way," especially when such a hustler as Albert C. Bostwick has undertaken to pull it off.

It comes about in this way. Leonce Blanchet, one of the founders of the Automobile Club of France, has been very courteously treated during his sojourn here by the Automobile Club of America and with characteristic French warmth of heart and reciprocal politeness cast about to show his appreciation of the club's hospitality. He found it on the last run of the club to Ardsley casino as a guest of Mr. Bostwick. On this occasion he saw Mr. Davis, Mr. Weston, Mr. Scott, Mr. Bostwick and some others mixed up in a bit of a race and heard the good humored banterings and challenges arising therefrom at the luncheon table that day.

The upshot of it all was that Mr. Blanchet has given a cup to be raced for at the next run on April 14, rain or shine, open to all motor vehicles, tricycles barred, driven by club members and carrying at least two people. To this the club has added diplomas to the first three to finish. Entries will close with the chairman of the run committee, Mr. Bostwick, at noon on April 12, and entrants will be informed of the time to start and course of the race when they make their entries.

Mr. Bostwick at once sought Chairman Batchelder of the N. C. A., who cheerfully agreed to furnish competent timers, and then hastened to join the L. A. W. and get road information at league headquarters.

It would seem that the Merrick Road,

a local straightaway piece of macadam, would make an ideal course. There is a triangular course in the Merrick district of twenty miles running through Valley Stream, Freeport and Hempstead—the measured, official course of the Century Road Club of America. This latter would give a convenient chance for timing intermediate distances and the denizens of that section of Long Island are accustomed to road racing and in part friendly to it. Such a course might also be adopted as an official one for time trials by the Automobile Club of America, where a chauffeur might go to try out his new wagon or settle a little difference of opinion with a rival in speed matters.

S. T. Davis, who won the Ardsley race, is sure to be a starter. Mr. Weston was entered in that race with a new wagon and was sure he could go much faster when his machinery got limbered up. Mr. Bostwick, who had previously beaten the Ardsley winning vehicle in a snow race, had hard luck with his wagon in the race, and finished fifth. He will ship a new racing wagon direct to Paris, whither he sails on April 18, and he may have still another new racing wagon to ride in the race on the 14th. The race between the Davis-Weston-Bostwick trio should be a warm one.

Mr. Winton, who will represent America in the international race on June 14, will sail on May 5. Mr. Riker, the other member of the American team, is building a gasoline motor vehicle for the race, which will be completed in time for him to sail with it in the middle of May.

THE COURSE SELECTED

New York, April 9.—Chairman Bostwick, in charge of the fifty-mile race of the Automobile Club of America for the Leonce Blanchet cup next Saturday, has selected the course for the race. It will start from Springfield a few miles beyond Jamaica and run straightaway to Babylon and return, which completes the

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MOST RELIABLE IN THE WORLD!

This *unsolicited* testimonial from the recognized World's Champion to a professional racing man in America:

—So says Harry Elkes.

PARIS, FRANCE, March 18, 1900.

"In regards to motors the only reliable one is the DeDion * * * * I will let you know from time to time about what comes up in the way of motors, but if you get a LeDion they can't beat you. The Aster Motor is thought very little of here."

A Word to the Wise is Sufficient!

KENNETH A. SKINNER

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In the manufacture of Cold Drawn Tubing it is necessary to use the most carefully selected material, free from all physical imperfections, such as laps, seams, and blow holes.

Shelby Tubes are very tough, dense and exceedingly ductile.

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whole distance. The cars will be started thirty seconds apart and there will be timekeepers at the two railroad crossings to deduct time for any delays through passing trains.

A TRAVELLER'S OPINION

New York, April 9.—John A. Blaurock, of the International Vehicle and Bicycle Tire Co., arrived by the St. Louis yesterday.

"It struck me," said he, "that the foreign motor-vehicles were very clumsy as compared with our own, though having been much longer at the game they are doubtless considerably ahead of us on the motors at present. I think, though, it will be the old story of the bicycle over again. They will hold their own until our makers have more experience and really get going and then we will beat them out on lightness and mechanism in the same old way."

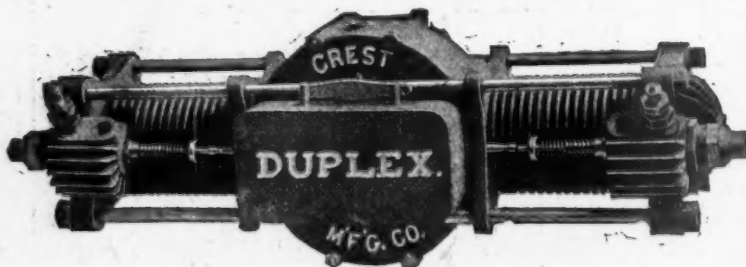
COMMITTEE OF ARRANGEMENT

J. J. Donovan, Frank Bemis and J. C. Kerrison have been appointed a commit-

tee to select the course for the Champion-Skinner series of motor tricycle races, to name the date and to arrange other details. Champion and Skinner have each deposited \$50 with Mr. Donovan, who is cycling editor of the Boston Globe. Champion is to use an American tricycle, made by the Waltham Mfg. Co. and fitted with an Aster 2¼ horsepower motor, and Skinner a French tricycle fitted with a 2¼ horsepower De Dion motor. Skinner was adverse to using the limited size motor, preferring to use his professional motor imported from France, but the Boston papers strongly urged him to accede to the limitation on the grounds that a test be made of the motor usually fitted to the regular road machine for efficiency and ease of control.

On March 23, Rigal, the Frenchman, broke the 100-kilometer (62½-mile) road record, on the famous Etampes-Chartres course, making 1:30:49 1-5, as against the previous 1:46:12 3-5 and Beconnais' track record of 1:30:55 2-5. Rigal rode fifty kilometers in 43:50.

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The Lightest Motor per Horse Power made in the world. Weight only 92 lbs.

FOUR HORSE POWER

Speed regulated from five to thirty miles per hour. No water jacket; air cooled, electric ignition, no vibration, self oiling and noiseless.

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For Motor Vehicles

Dixon's Pure Flake Graphite Lubricants for Engine Cylinders, Chains, Gears, Bearings, etc. Nothing can equal them.

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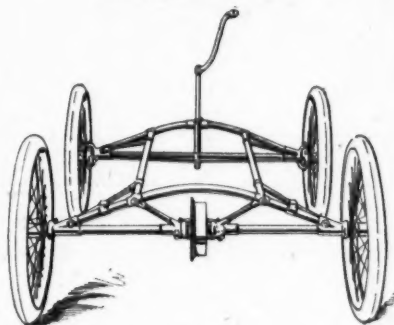
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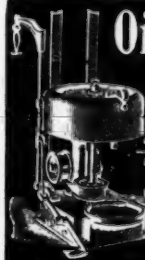
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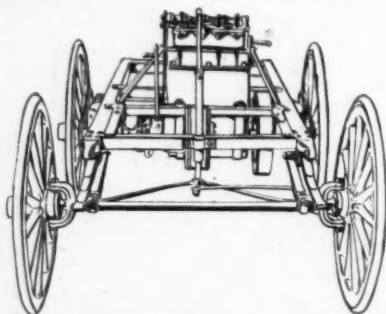
Send drawings or blue prints showing what you want, and we will furnish an estimate on the job. All of our work is first-class.

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With wheels, solid or pneumatic tires, transmission gear giving two speeds forward and reverse, and our 4½-horsepower, four-cylinder, shifting spark, gasoline motor, having variable speed from 100 to 1,500 revolutions a minute. The addition of a body, gasoline and water tanks, upholstery and paint makes it a complete vehicle capable of going anywhere and at any speed up to thirty miles an hour.



Send for catalogue of the best motor in any country, made in various sizes and number of cylinders, upright and horizontal, with fuller particulars of running gear.

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Gasoline Engines!

OPPOSED CYLINDERS,
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Latest, Most Compact Design for Vehicles & Launches
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Brazing...

Bike Steel Castings

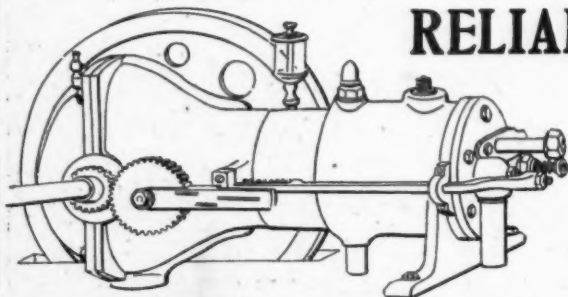
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